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ACCOUNT

OF SOME

EARLY PROPOSALS

FOR

STEAM NAVIGATION.

BY

STEPHEN PETER RIGAUD, M. A.

SAVILIAN PROFESSOR OF ASTRONOMY.

OXFORD,
PRINTED BY S. COLLINGWOOD, PRINTER TO THE UNIVERSITY, FOR
THE ASHMOLEAN SOCIETY.
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EARLY PROPOSALS
FOR
STEAM NAVIGATION.

READ TO THE ASHMOLEAN SOCIETY, FEB. 26, 1838.

JONATHAN HULLS, in 1736, took out a patent for "carrying vessels and ships out of and into any "harbour, port, or river, against wind and tide, or in "a calm." In the following year he published a description of his method, which consisted in towing them by a steam boat. The copies of the original edition of this tract are very scarce; but it was reprinted at the end of Mr. Partington's Lectures on the Steam Engine (1826), and well deserved to be recalled to public notice. The draw-boat was to be furnished with a pair of wheels, to the axis of which arms were attached with flat boards (which he calls fans) at their extremities; and great ingenuity is said, upon very good authority[a], to be displayed in the contrivance, not only of the method by which a circular action was produced, but of that by which the motion of the engine was regulated.

The wheels were placed at some little distance behind the stern of the boat, which at first sight seems objectionable; and would be so, if it had been intended to act independently; but connected, as it was to be, with the ship which it had in tow, the wheels came more nearly to what may be considered as the centre of the compound body, which they were the means of propelling.

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[a] Tredgold on the Steam Engine, p. 15.

This is the earliest notice which most writers have given of any attempt to apply the force of steam to navigation; and it probably did not succeed, since the object seems to have been abandoned and considered as unattainable, till it was again resumed in the latter part of the last century. There is, however, preserved in the Registers of the Royal Society a plan for this purpose, devised by Dr. Papin, and submitted to their consideration in 1708. On the 11th of February, the Journals record that "a proposal was read" by him "concerning a "new invented boat to be rowed with oars moved "with heat," and it was mentioned again on the two next successive general meetings of the Society. It appears to have come with a letter of recommendation from Leibnitz, and Papin's own account is as follows:

"[b]It is certain that it is a thing of great conse-"quence to be able to apply the force of fire for to "save the labour of men; so that the parliament "of England granted, some years ago, a patent to "Esq. Savery, for an engine he had invented for "that purpose; and his Highness Charles Land-"grave of Hesse hath also caused several costly "experiments to be made for the same design, "as appears by books printed upon that subject. "But the thing may be done several ways, and the "machine tried at Cassel differs from the other in

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[b] Register of R. S. vol. IX. p. 108.

" several particulars, which may afford a great difference in the quantity of the effect. It will be " good, therefore, to find out clearly what can be " done best in that matter, that those which will " work about it may surely know the best way they " are to choose. I am fully persuaded that Esq. " Savery is so well minded for the public good, that " he will desire, as much as any body, that this may " be done.

" I do therefore offer, with all dutiful respect, to " make here an engine, after the same manner that " has been practised at Cassel, and to fit it so that " it may be applied for moving of ships. This engine " may be tried, for an hour or more, together with " some one made after the Saveryan method. The " quantity of the effect should be computed, both by " the quantity of the water driven out of each machine, and by the height the said water could " ascend to. And to know the said height, we " should use the method advised by the illustrious " president, viz. to try to throw bullets by the said " engine with the inclination of 45 degrees, and " reckon that the said height is half the horizontal " distance to which the bullets will be driven, and " this would be the rule so well for one as for the " other machine.

" I wish I were in a condition to make the said " Casselian engine at my own charges, but the state " of my affairs doth not permit me to undertake it, " unless the Royal Society be pleased to bear the " expense of the vessel called retort in the description printed at Cassel: but after that I will lay " out what is necessary for the rest; and I will be "content to lose that expense, in case the contrivance of the Landgrave of Cassel doth not as much "again as that of Esq. Savery. But, in case the "effect be such as I do promise it, I do humbly de"sire that my expense, time, and pains may be "paid, and I reckon this to amount to 15 pounds "sterling: because, as I said, the state of my affairs "doth not permit me to undertake the thing other"wise. If the Royal Society be pleased to honour "me with their commands upon such conditions, "the first thing to be done is to let me see the place "where the machine must be set, and I will work "for it with all possible diligence, and I hope the "effect will yet be much greater than I have said."

It is melancholy to think that experiments of consequence were, in those times, checked by the want of funds for carrying them into execution, and that such a sum as fifteen pounds should have been considered, in the present instance, as an important obstacle. The Society, also, seems to have had a difficulty in coming to any decision on the subject; for on the third day of meeting, the proposal was referred to the president, Sir I. Newton, who at the end of a fortnight made his report upon it. Every thing from his pen has a value, especially when, as in this case, it affords a good instance of that sound caution with which he always sought for truth in the result of actual experiments. I have copied it as follows:

"If the pump proposed by Dr. Papin can spout "out 400lb. of water, every other second minute[b], "with the swiftness of 128 Paris feet in a second,

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[b] Minutum secundum—second.

" it will spout it up 100 yards high, or cast it to " the distance of 200 yards upon level ground, and " do this thirty times in a minute. Whether this " can be done is to be known only by experience; " and if it can be done, I do not see but that such a " pump may be successfully applied to several uses, " as the making artificial fountains, to the draining " of water out of trenches, morasses, mines, &c. in " difficult cases, and to the towing and moving of " ships and galleys, by the recoil of the engine and " force of the stream duly applied. But the force " and uses of the engine must be learned gradually " by trying the simplest and cheapest experiments " first, and reasoning from those experiments."

No record has been found of any such experiments, and it is probable that they were never made. The expressions used by Newton seem to indicate that the propelling force was to be exerted by a stream of water, ejected from the stern of the vessel[c], a method but ill adapted for giving motion to a boat which had another to be drawn after it; but of this we have no particulars, and the whole discussion seems to have turned on the power of the engine. If that could have been established, no doubt seems to have been entertained of its being applicable to the intended purpose.

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[c] In 1730, Dr. John Allen published a short work in 4to, entitled, " Specimina Ichnographica, or a brief Narrative of several " new inventions and experiments, particularly the navigating a " ship in a calm." His plan, which he imagined to be entirely new, was to propel the vessel by a stream of water which was to be ejected from its stern, and for this purpose he thought of the use, which might be made of the steam engine. (p. 36.)

With this view Capt. Tho. Savery addressed two letters to his friend Dr. J. Harris, author of the Lexicon Technicum, which were read before the Royal Society in May 1709, and copies of them are preserved in their Register. They state the objections to Papin's contrivance, and shew that it was totally inadequate to the great and rapid effects to be produced by it. Nothing, however, is said in them on its application to the motion of paddle-wheels, which makes their contents less intimately connected with the present purpose: and there may be a future and a better opportunity for discussing them. They contain some particulars that illustrate the personal history of Savery: and although his name has long been known, and never can be forgotten, very little about him has been handed down to us, and of that little some parts are certainly erroneous. Endeavours therefore will be made to collect these scattered notices into something of a continuous narrative, and to add what other particulars can yet be discovered in reference to him. They cannot, of course, after the subject has been now neglected for more than a century, be numerous, but from his connection with the original invention of the steam engine, they may form a sequel to the present communication.

It must be remembered, also, that in those early days the valves were all opened and shut by hand; Savery therefore argues conclusively to the impossibility of such an engine as Papin's continuing to work with the rapidity which was promised; and he says, "I fear that there are not many men so mira- "culously nimble," as to continue the repetition of what would be necessary, in each succeeding second of time; "which yet Dr. Papin plainly proposes."

This paper of Papin and Savery's letters never having been published, the only writer, that has been found to be aware of them, is Mr. Farey, who mentions their contents in his elaborate Treatise on the Steam Engine[d]. He likewise notices[e] a still earlier proposal of Papin for the same purpose, in the Acta Eruditorum for 1690. Mr. Farey gives a good account of it in general, but it will answer better for our present object, and be possibly more satisfactory, to translate the whole passage in which the advantages are stated which might be derived from this use of his engine.

"Perhaps," says Papin[f], "it would be tedious to enlarge on the methods, by which this force [of steam] "may be applied to draw the water and the ore out of "mines, to throw iron balls to the greatest distance, "to propel vessels against the wind, and for many "other similar uses. Every one, as occasion may "require, must devise for himself that form of the "machine, which will be best suited to his purpose; "but I must in general point out the many ways, in "which this force would be preferable to that of "common rowers, for giving motion to ships at sea. "1. Common rowers add considerably to the weight "of the vessel, and so far impede its progress. "2. They take up much room, and in that way "become a burthen to it. 3. It is not always that "the necessary number of them can be procured. "4. Whether they are labouring at sea or resting in "port, they must be supplied with food, which creates

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[d] P. 110. [e] P. 98. [f] P. 412.

"a great additional expense. Our tubes, on the contrary, are of very little weight, occupy no great "space, and could, if manufactures were once established of them, be always easily obtained in any "required quantity: the expense afterwards would "also be confined to the time when they were at "work, and would be no more than the value of the "wood which they consume. Common oars, however, could not be conveniently employed in this "way, and it would be necessary to use for this "purpose those of a rotary construction, such as I "remember to have seen at London. They were "affixed to a machine made by direction of Prince "Rupert[g], and were set in motion by horses, so as "to produce a much greater velocity than could be "given by sixteen watermen to the Royal Barge. "Without doubt, oars fixed to an axis, could be "most conveniently made to revolve, in this manner, by our tubes. It would only be necessary to "furnish the piston rod with teeth, which might "act on a toothed wheel properly fitted to it, and "which being fixed on the axis to which the oars "were attached, would communicate a rotary motion "to it."

It may be observed that in this, as in the paper which Papin afterwards submitted to the Royal Society, he particularly alludes to the projection of balls by the force of steam, and from this we perceive that the idea adopted by Mr. Perkins, and so curiously exemplified in his steam-gun, had occurred, and had probably (though to a limited extent) been carried into execution, much more than a century before. The most remarkable part, however, of the last quoted passage, is the great usefulness of the object which Papin contemplates in it. In the detail he fails. He seems to have thought of fixing his oars independently of each other as radii from the central axis; and this form had occurred to others, although it certainly wants the firmness and mutual support, which is obtained by fixing the boards upon the paddle-wheel which is now in use. Again, toothed wheels will never stand for such violent action; even Watt, when he first applied them to producing a circular motion from the alternate rise and fall of the beam of his engine, and adopted the beautiful contrivance of the sun and planet motion, very soon found it necessary in practice to abandon them. Besides, Papin was a man of a different character, whose talent lay rather in speculations on ingenious combinations, than in the mechanical power of carrying them into execution on a great scale.

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[g] In 1680. See Macpherson's Annals of Commerce, vol. III. p. 597.

We have thus, from authentic sources, traced up the suggestion of steam navigation to the original time of the engine, on which it depends—at least as far as that era has been generally understood: and we now add an account published within these few years, which carries it back to a period, which was never before contemplated.

In 1831 there came out "A Year in Spain by a "young American," in which the following remarkable passage occurs[h].

"It appears from a late valuable publication, Na-"varete's Collection of Spanish Voyages and Dis-

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[h] Vol. 1. p. 49, note.

" coveries, that the first known experiment of propelling a vessel by the agency of steam was made at " Barcelona. . . . Singular however as the fact may be, " it is fully established by various documents lately " found in the archives of Simancas, and is so circumstantially stated as to be incontrovertible. It " appears that in the year 1543 a certain sea officer, " called Blasco de Garay, offered to exhibit before " the emperor Charles V, a machine, by means of " which a vessel should be made to move without " the assistance of either sails or oars. Though the " proposal appeared ridiculous, the man was so much " in earnest, that the Emperor appointed a commission to witness and report upon the experiment. " It consisted of Don Enrique de Toledo, Don " Pedro Cardona, the treasurer Ravago, the Vice-" Chancellor Gralla, and many experienced seamen. " The experiment was made the 17th June 1543 on " board a vessel called the Trinidad, of 200 barrels " burden, which had lately arrived with wheat from " Colibre. The vessel was seen at a given moment " to move forward and turn about at pleasure, without sail, or oar, or human agency, and without " any visible mechanism except a huge boiler of hot " water, and a complicated combination of wheels " and paddles. The assembled multitude were " filled with astonishment and admiration. The " harbour of Barcelona resounded with plaudits, and " the commissioners, who shared in the general enthusiasm, all made favourable reports to the Emperor, except only the treasurer Ravago. This " man, from some unknown cause, was prejudiced " against the inventor and his machine. He took

" great pains to undervalue it, stating, among other " things, that it could be of little use, since it only " propelled the vessel two leagues in three hours, " that it was very expensive and complicated, and " that there was great danger of the boiler bursting " frequently. The experiment over, Garay collected " his machinery, and having deposited the wooden " part in the Royal arsenal, carried the rest to his " own house.

" Notwithstanding the invidious representations " of Ravago, Garay was applauded for his invention, " and taken into favour by the Emperor, who pro-" moted him one grade, gave him 200,000 marave-" dies, and ordered the jealous treasurer to pay all " the expenses of the experiment. But Charles was " then taken up with some military expedition, and " the occasion of conferring an inestimable benefit on " mankind was neglected for the business of blood-" shed and devastation, while the honour, which " Barcelona might have received from perfecting " this noble discovery, was reserved for a city which " had not yet started in the career of existence."

The very little intercourse, which formerly existed on scientific subjects, makes it not impossible that even a magnificent invention, like this, may have sunk into oblivion. The Quarterly Review[i], in a recent number, describes the author (Capt. Slidell of the American Navy) as a writer of " good faith ;" and there always is an impression, that no one, with any claim to respectability, can ever be so utterly regardless of truth, as seriously to state a circumstantial tale without some foundation for it. The same account was also inserted in the Literary Gazette for 1827[k]; but the critical examination of the question must be left to those, who have the advantage of being acquainted with the Spanish language, and have the opportunity of examining the original authorities, on which the statement depends. The Catalonians indeed were always the most enterprising people of the Peninsula; but the machinery, necessary for the effect here described, seems to be beyond the age in which it is said to have been constructed, and it is difficult to persuade oneself implicitly of its existence.

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[i] Vol. LIX. p. 329.—Oct. 1837.

[k] P. 382.

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